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Second Session: Genetical.

Introduction.

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Since the birth of his science at the turn of the century, the geneticist has had a profound interest in pigment. Color variations readily attracted his attention. It was through the study of coat color characters in mice and other rodents, plumage color in the fowl and eye color in *Drosophila* that much of the basic information on gene segregation, linkage, sex-linked characters, etc., was derived.

In his book on the Genetics of the Mouse, Grüneberg lists coat color genes located at 10 different loci, and two series have 5 alleles each. To this list could be added several more recently discovered coat color mutants as well as three genes controlling distribution of pigmented areas. Analyses of these characters by Cuenot, Little, Castle, Morgan, Dunn and others constituted a major portion of the mammalian genetics of the first quarter of the century.

Beyond the study directed at the gene itself, the geneticist is next interested in linking the gene to the biological character. He wants to analyze the physiological and biochemical steps between the primary gene action and the end result. Here again the study of pigment has offered especial advantages as emphasized by the work of those reporting at this conference and of others, particularly Beadle and Ephrusi, and Wright and his students. As compared to other gene action paths those concerned with color appear to be relatively simple. Furthermore the processes occur in cells readily accessible, and the history of these processes may be accurately recorded in such structures as the hair or feathers.

It is in studies such as these that the geneticist meets face to face with the biochemist, for final analysis of the gene action paths is on the biochemistry level. On the other hand the geneticist can be of great aid to the biochemist for already the geneticist has identified many of the genes related to the enzymes involved.

The pigmented tumors afford a special field of physiological genetics. Those in the fruit fly and the platyfish hybrids have been of particular value because of the adaptability of both organisms to genetic and cytologic analysis and also because of the vast knowledge of the genetics of both organisms but particularly of the fruit fly. Along with the physiology of pigment formation is that of the malignant transformation, thus presenting a picture in which there is some danger in confusing the two sets of processes. Are the genes which are responsible for the presence of the pigment cell, also in part at least responsible for the abnormal growth of the cell, or is the inheritance of the pigment cell more in line with that of eye and hair color, and the inheritance of the control of the growth of the cell in line with the genetics of neoplasms derived from other types of cells? In either case, what are the processes involved? As will be indicated in the reports of this section, much progress has been made in answering the basic questions in these fields of physiological genetics.

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Significance of Quantitative Histological Studies of Pigment Found in the Coat Color Mutants of the Mouse to Questions of Normal and Atypical Cell Growth.

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Differences in visual effect of pigments in mouse hair are determined by variations in seven attributes of the melanin granules deposited there. Quantitative histological studies have shown four key pigmentation characteristics, relatively independent of